



Steamtown

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Scranton, Pennsylvania



On March 14, 2007, our Locomotive Shop staff replaced two tires on the main drive wheels of the [Canadian Pacific 2317](#). The old tires were “sweated” off, new ones installed and then re-cut to the proper diameter. This virtual demonstration shows how the new tire is mounted to the drive wheel.





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These are two new tires for Canadian Pacific 2317. New tires may be needed for many reasons -- the tire or the flange is too thin (possibly from too many reshaping on a lathe) or the tire is damaged. The third drive axle tires on Canadian Pacific 2317 had very thin flanges.





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The tire is cut 55/1000s of an inch smaller than the wheel it will be fit on. Steel expands when it is heated, and a gas ring will be fitted on the tire.





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Just like a car, only the tire is replaced. The wheels are individual sand-castings and, even a hundred years ago, could be expensive; the thin rolled-steel ring (the tire) are much less so. A stand holds the wheel set (wheels and axle) off the floor.





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Each tire is cut for one, and only one, wheel. Wheels on the same axle can be off by a hundredth of an inch or more, so when the inner diameter of the tire is trimmed (it must be 55/1000's of an inch smaller than the wheel), it must match the wheel. This drive wheel is 67.956 inches in diameter (5'7").





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A park Preservation Specialist creates a bracket to help install the tire. The bracket fits on the forks of a forklift and hold the tire against the wheel during the heating process. Often, our Shop staff must create the tool needed for the job at hand before working with these historic machines.





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This bracket, made in the Locomotive Shop, holds the new tire slightly above the wheel. When the tire is heated to the proper temperature and has expanded, workers slide it onto the wheel using sledge hammers.





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**A park Preservation
Specialist positions a lifting
band on a tire.**





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The new tire is relatively light (only a few hundred pounds) so the small hook on the overhead crane is used. This must be done slowly and carefully to avoid damaging the rolled steel tire.





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As the tire is lifted to a vertical position, any oscillations are damped to prevent damage.





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The tire is lowered onto the bracket. When the straps are removed, the next step is placement of the gas ring.





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The gas ring is in place around the new tire. Fed by hoses at the bottom, the gas/oxygen mixture travels through the ring and out small holes.





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The flame is lit and swiftly
envelops the new tire.





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The flow of oxygen is cut back to produce a bluish flame which is much hotter.





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A close-up of the flames at the bottom of the new tire. The new tire must be heated to about 200-250° F above the ambient temperature in order to expand enough to slide over the wheel.





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A park Preservation Specialist uses a sensor to check the temperature of the steel wheel. The wheel must be hot enough (around 300°- 350° F) to expand, but must not exceed 600° F. Above 600° F, the temper may be taken out of the steel, changing how much it can flex.





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A sledge-hammer is used to move the tire onto the wheel. Steam railroading is an odd combination of measuring to within a thousandth of an inch, and then using a larger tool to achieve results!





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The gas ring is removed and workers check to ensure the tire is fully set on the wheel.





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Workers ensure that the
new tire is properly
mounted on the wheel.





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Clamps hold the tire in place on the wheel as it cools. The tire shrinks and tension between the tire and wheel holds the tire in place.





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A Volunteer-in-Park (VIP) uses a wheel lathe to cut the new tires. Only one set of tires (one axle) is being replaced and all the drive wheels of a steam locomotive must be the same diameter because they are linked with connecting rods.





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As the drive wheel set rotates, a cutting blade removes a quarter-inch deep “shaving” from the new tire. When the diameter approaches the size of the old tires, a different blade does the final shaping.





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We hope you enjoyed this demonstration showing one of the many maintenance and repair functions available in our [Locomotive Shop](#). Park ranger or volunteer-led walking tours are offered on most days. Some lucky visitors were able to observe this 'ring of fire' during their tour.

